EUPHORBIA JOHNSTONII (EUPHORBIACEAE), A NEW SPECIES FROM TAMAULIPAS, MEXICO, WITH NOTES ON *EUPHORBIA* SUBSECTION *ACUTAE*

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ABSTRACT

Euphorbia johnstonii, a newly recognized species from northern Tamaulipas, is described and illustrated. It most closely resembles *E. acuta*, from which it is distinct in its less upright habit, shorter, wider leaves, shorter, appressed vestiture, and geographical distribution. *Euphorbia johnstonii* is a member of Boissier's subsection *Acutae*, a group of *Euphorbia* which are morphologically intermediate between *Euphorbia* subgenus *Agaloma* and *Euphorbia* subg. *Chamaesyce*. Three species considered here to belong to subsect. *Acutae* are mapped and compared.

RESUMEN

Se describe e ilustra **Euphorbia johnstonii** una especie nueva del norte deTamaulipas. Esta especie es semejante a *E. acuta*, de la cual se distingue por su hábito menos erecto, menor tamaño, hojas más anchas y cortas, indumento adpreso y distribución geográfica diferente. *Euphorbia johnstonii* es miembro de la subsección *Acutae* de Boissier, un grupo de *Euphorbia* morfológicamente intermedio entre *Euphorbia* subgénero *Agaloma* y *Euphorbia* subg. *Chamaesyce*. Se mapean ycomparan las tres especies consideradas dentro la subsección *Acutae*.

Boissier (1862) placed *Euphorbia acuta* Engelm., *E. angusta* Engelm. and *E. lata* Engelm. in his subsection *Acutae* of the section *Anisophyllum* Roeper. The section *Anisophyllum* is now recognized as the genus *Chamaesyce* S. F. Gray by some recent *Euphorbia* specialists (Webster 1967; Koutnik 1987, 1984; Hassall 1976) or as *Euphorbia* subgenus *Chamaesyce* Raf. (Oudejans 1989, Carter 1988, Johnston 1975) by those who prefer a broader concept of *Euphorbia*. Three synapomorphies cited as evidence of monophylesis in subgenus *Chamaesyce* are terminal differentiation of the apical meristem with the formation of the first pair of leaves (Hayden 1988), C_4 photosynthesis (Webster et al. 1975), and the possession of obvious, nonglandular, interpetiolar stipules (Koutnik 1987). Members of the subsect. *Acutae* resemble subg. *Chamaesyce* in their entirely opposite, asymmetrical leaves and four-glanded cyathia but (excluding *E. lata*) are

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aberrant in their C_3 photosynthetic pathway (Webster et al. 1975) and glandular stipules. *Euphorbia johnstonii* Mayfield sp.nov., in common with subg. *Chamaesyce*, has opposite, asymmetrical leaves and four-glanded cyathia, but, like members of the subsect. *Acutae*, has linear, glandular stipules and no organized bundle sheath (pers. obs. at ×400 without staining) indicating C_3 photosynthesis. Within *Euphorbia*, this combination of characters is unique to the subsect. *Acutae* supporting a close relationship between *E. johnstonii* and these taxa. Cytological evidence suggests a base number of × = 14 for the subsect. *Acutae* (Urbatsch et al 1975), however *E. johnstonii* is yet to be counted. *Euphorbia lata* possesses persistent, interpetiolar stipules and C_4 photosynthesis and, in spite of a chromosome number based on × = 14 (2n = 28II, Keil 1976), is not part of the subsect. *Acutae* as defined above. Therefore, *Euphorbia* subsect. *Acutae* includes only those three species here shown to possess glandular stipules and C_3 photosynthesis, and which, in these features, depart from other members of the subgenus *Chamaesyce*.

Euphorbia johnstonii Mayfield, sp. nov. (Fig. 1).

Euphorbiae acutae Engelm. similis sed habitu subprostrato, foliis brevioribus latioribusque, et caulibus vestimento strigoso differt.

Perennial herbs with minute, appressed pubescence; stems arching to nearly horizontal or prostrate; vestiture mostly sparse to canescent on young growth, white, trichomes not more than 0.20 mm in length. Roots tuberous, fusiform, to ca. 8 cm long and 1.5 – 2.0 cm wide, 2 – 8 cm below the soil surface. Underground stems persistent, produced singly, ca. 1 – 15 cm long, often thickened and branching at ground level to produce 1 – 5 aerial stems. Aerial stems articulated, few to numerous, radiating from the underground stem apex, to ca. 15 cm long, 0.9 – 1.4 mm thick, stramineous at maturity; internodes (2-) 4 – 10 (-20) mm long. Stipules 2 per node, glandular, caducous (rarely evident), subulate, basally canescent, 0.9 – 1.5 mm long. Leaves opposite; petioles brief, usually 0.4 – 0.6 mm long; blades broadly ovate, (3-) 5 – 8 (-13) mm long, (4-) 6 – 8 (-12) mm wide; abaxially pubescent with evenly-distributed, outcurved trichomes ca. 0.2 mm long, these reaching the margins of the adaxial surface which is otherwise glabrous, or sometimes sparsely beset with similar, though scattered trichomes; base asymmetric, rounded, or less often cordiform; apex obtuse, produced into a shortly acuminate point. Cyathia solitary at the nodes on the distal-most 1/3 to 1/2 of the stems, strigulose, the orifice slightly constricted, ca. 2.0 mm high and 2.3 mm wide just below the glands; peduncles 0.8 – 1.2 mm long; glands 4,sessile, oblong to narrowly elliptic, slightly convex, burgundy to red-brown, 0.4 – 0.6 mm in width

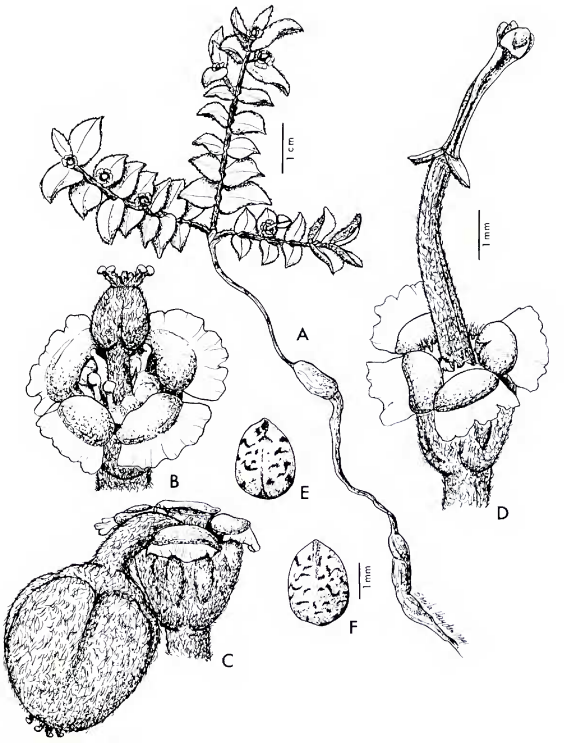

FIG. 1. A. Habit (1 cm bar); B – D. Cyathium at various stages of development (1 mm bar, upper right); B. at onset of female pedicel elongation; C. late in male flowering phase; D. after capsule dehiscence; E – F Seed, ventral and dorsal sides, respectively (1 mm bar, lower middle). Drawn from isotype (*Mayfield et al. 762*, URV).

(in the radial plane of the cyathium), 1.1 – 1.5 mm long (tangential to the rim of the cyathium); appendages basally the same width as the glands, slightly wider at their apex, ochre-white, 0.2 – 0.6 mm long, the margins erose to crenulate, rarely deeply parted. Staminate flowers 25 – 35 per cyathium. Pistillate flowers, at anthesis, borne on pedicels ca. 2 mm long, ovary densely appressed-tomentose; styles 3, distinct from the base, ca. 0.5 mm long, bifid for 1/3 – 1/2 their lengths, stigmas as wide as or slightly wider than the styles. Capsules 2.6 – 2.8 mm long, sparsely appressed-puberulent, pedicels to 6 mm long at dehiscence. Seeds (2.1-) 2.2 – 2.3 (-2.6) mm long, 1.6 – 1.7 mm wide, ovate in outline, obscurely 4-angled in cross-section; seed surface mostly pale with broad, light to dark-brown, obscurely transverse, shallow depressions.

Type: MEXICO. Tamaulipas: 47 mi (76 km) S of the bridge at Reynosa on the San Fernando Hwy (Mex 97), 29 mi (47 km) N of the jct. with Mex 101, between the towns of Alfredo V. Bonfil and Pedro J. Mendez, caliche cuesta with dark, fine grained, loamy soils, elev. 59 m, N 25° 26′25″ W 98° 13′22″, 11 Jul 1991, *Mayfield et al. 762* (HOLOTYPE: TEX; isotypes: MEXU, URV, US).

Additional collections examined: MEXICO. Tamaulipas: 10 mi E of Abasolo on the road to [La] Pesca, near Los Añejos, 900 ft, caliche upland of the Goliad Cuesta, 6 Feb 1960, [*Crutchfield and*] *Johnston 5041* (TEX); 13 mi E of the Abasolo turnoff on the Santandar Jimenez-Pesca road, 15 Dec 1960, [*Crutchfield and*] *Johnston 6140b* (TEX); 3 mi W of Morales, 19 mi E of the Matamoros-Victoria Hwy on the road to Loreto, calichified sand upland with short brush and prairie openings on the deeper sand, frequent perennials, Apr 26 1960, [*Crutchfield and*] *Johnston 5346* (TEX); km 164 on Matamoros-Victoria Hwy 101, rocky roadside, *Leucophyllum* dominant, 22 Apr 1971, *Richardson 1415* (TEX); 48 mi from Reynosa on the San Fernando road, 27mi from Matamoros-San Fernando Hwy turnoff, brush on caliche spot, 19 Oct 1959, *Johnston and Graham 4381* (TEX); 47 mi S of Reynosa on the road to San Fernando, short brush on caliche outcrop, abundant perennial herbs, 25 Apr 1960, [*Crutchfield and*] *Johnston 5333* (TEX). Nuevo Leon: Monterrey Hwy, 65 km S of Nuevo Laredo in hard, sandy marl and silt, 7 Apr 1962, *Dominguez M. and McCart 8243* (TEX).

Euphorbia johnstonii most closely resembles *E. acuta*, from which it is distinguished by its shorter pubescence and shorter, wider leaves. In vestiture, *E. johnstonii* is nearly identical to *E. angusta*, a plant strikingly different in its lance-linear to linear leaves and strong, woody taproots. In the field, the low stature and short, arching (sometimes prostrate) stems of *E. johnstonii* (Fig. 1) are very different from the longer, decumbent to ascending stems of *E. acuta* and *E. angusta*. *Euphorbia acuta* often has red leaves in the late part of the growing season, a character not observed the either of the other species. Mature seeds offer the best characters for differentiation of these three species. A tabular comparison of morphological differences between the three species is given in Table 1.

TABLE 1. Morphological distinctions between *E. johnstonii* and its nearest relatives.

	E. johnstonii	*E. acuta*	*E. angusta*
Vestiture	appressed; trichomes 0.3 mm long	spreading; trichomes 0.3 mm long	appressed; trichomes 0.3 mm long
Leaf shape L:W ratio	Ovate 1.3:1 or less	Lance-ovate 1.3–4.0:1	linear to lance-linear greater than 5.0:1
Aerial stems	arching strongly to prostrate; up to 15 cm long	decumbent to ascending; 20–35 cm long	always ascending; 30–40 cm long
Seeds	shallowly alveolate; depressions brown, ridges pale	smooth; concolorous	obscurely transversely rugose; concolorous
Cyathium	campanulate; ca. 2.0 mm wide	turbinate; ca. 1.5 mm wide	funnelform; ca. 1.0 mm wide
Male flowers	25–35	20–25	5

The new species is allopatric with respect to its nearest congeners (Fig. 2) and is almost exclusively confined to the state of Tamaulipas, Mexico. This was the initial clue to its distinctiveness. The only botanist to have systematically collected in this vicinity was Marshall C. Johnston and associated collectors in the late 1950's and early 1960's. Because his collections account for the majority of exsiccatae, the specific epithet is in recognition of his efforts. Lack of botanical exploration in addition to the ephemeral nature of the above ground parts may partially explain the paucity of specimens of *E. johnstonii*. Widespread habitat destruction in northern Tamaulipas since the 1950's may also be a factor. No specimens were seen from Texas, even though the nearest collection is within about 25 air miles of the border at San Ignacio in Zapata County, where similar habitat is found. The Rio Grande may provide a natural barrier for this plant which has its center of distribution farther south and east. Future collections will probably extend the range southward in Nuevo Leon and perhaps northwest into Coahuila.

Euphorbia acuta has the most westerly distribution of the subsect. *Acutae* with stations reaching northwestern Chihuahua and south-central New Mexico (Fig. 2). It seems to prefer calcareous or gypseous clayey soils of the Chihuahuan Desert. Current collections place the center of *E. angusta*'s distribution in the limestone uplands of the Edwards Plateau and adjacent Coahuila, but its occurrence far to the south in Coahuila's Sierra de la Gavia indicates a possible hiatus of collections from Coahuila. *Euphorbia johnstonii* appears to be restricted to the thornscrub of Tamaulipas, which extends into south Texas, northern Nuevo Leon, and extreme eastern Coahuila. To

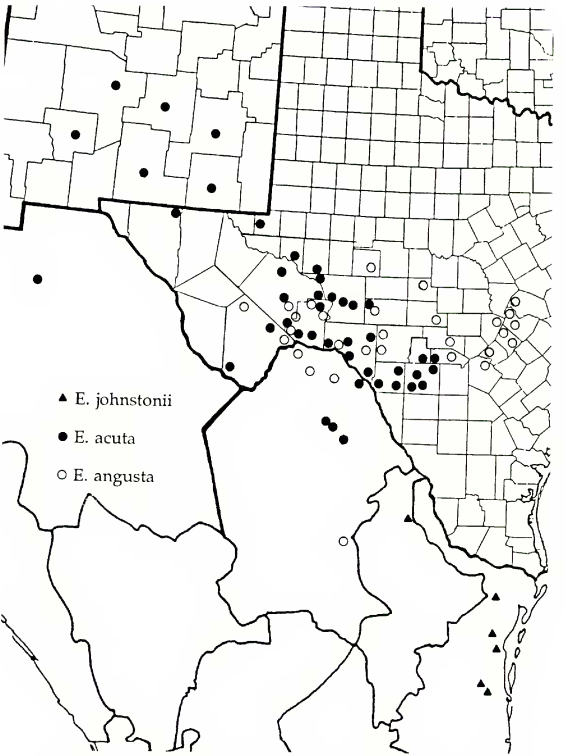

FIG. 2. Documented distribution of *Euphorbia johnstonii*, *E. acuta*, and *E. angusta*.

the north and west, Tamaulipan thornscrub blends into the Chihuahuan Desert and Edwards Plateau vegetation, where the other two species of the subsect. *Acutae* occur. The new species can be found in open areas on low, caliche-hills of the Tamaulipan coastal-plain and Rio Grande drainage in calcareous, sandy loam with *Asclepias prostrata*, *Leucophyllum frutescens*, *Guaiacum angustifolium*, *Turnera diffusa*, *Melochia tomentosa*, *Macrosiphonia lanuginosa*, *Heliotropium confertifolium*, and *Evolvulus* sp.

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